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Spit may expedite medical diagnoses

Web Posted: 05/12/2007 03:26 AM CDT

Don Finley
Express-News Medical Writer

First you spit.

Apply a drop or two of saliva to a plastic card, about the size of a bar coaster, embedded with a tiny chip. Fifteen minutes later, find out what ails you — from infections to heart disease to certain cancers.

That's the idea behind a federally funded, \$6.1 million project that includes researchers from San Antonio, Austin and Kentucky. At the heart of the project is a lab on a chip, developed by chemists and engineers at the University of Texas at Austin. A biosensor the size of a microchip can be taught to recognize dozens of antibodies and proteins that point to specific diseases.

To understand the scale, think of how diabetics prick their fingers and check blood sugar levels using a hand-held monitor. In this case, the chip contains dozens of beads coated with antibodies that fluoresce, or glow, when they recognize a particular infection. A portable device analyzes the results.

"It's called point-of-care diagnostics," said Dr. Spencer Redding, chairman of dental diagnostic science at the University of Texas Health Science Center. "Instead of taking that sample and sending it to a big lab, you take that sample and put it in this technology that the group at UT is developing, and so the doctor would get the result in their office in a matter of minutes."

But to make it work, the chip has to know what to look for, to know if someone has hepatitis B or a heart problem. So researchers at San Antonio's dental school — and several other universities — are searching saliva for the components that will allow engineers to program the chip.

The local effort is led by Chih-Ko Yeh, professor of dental diagnostic science at the health science center and an expert in sialochemistry (the study of saliva).

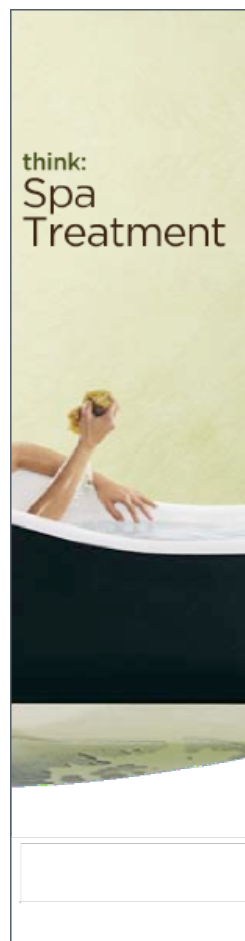
The major function of saliva is protecting the body from germs that enter through the mouth. Like blood, saliva contains antibodies and other infection-fighting proteins, as well as lubricating enzymes and growth factors, among other things.

"With infectious disease, there is antibody in the saliva," Yeh said. "HIV is one example. Right now there is an FDA-approved product using saliva to make a diagnosis of HIV status."

The appeal of diagnosing disease using saliva rather than blood is easy to understand. No needles, no ouch factor and (for most people) a limitless supply — since the average person produces almost a liter a day.

The National Institute of Dental and Craniofacial Research, which is funding the five-year project, is pushing hard for saliva-based medical tests. A separate effort, the Saliva Proteome Project, has been working to identify all the proteins in normal human saliva — similar to the Human Genome Project. The count so far: about 1,500.

The downside to using saliva over blood, the researchers say, is like the difference between pristine spring water and a puddle in the street.



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Blood is a closed system, containing little except the usual blood components, nutrients and an occasional infection. Saliva on the other hand contains the product of saliva glands, as well as cells and fluid from the gut, lungs and sinuses, plaque from teeth, bits of breakfast cereal — anything.

"Saliva is sort of a big catch-all," Redding said.

The San Antonio group is initially focusing on AIDS, hepatitis B and C, and heart disease — the latter in partnership with the University of Kentucky, where saliva is collected from patients within 24 hours of their heart attack.

Preventing heart attacks would be an ideal use for the technology, said John McDevitt, professor of chemistry at UT Austin who developed the technology and who serves as the principal investigator of the project.

"It's the No. 1 health problem in the States," McDevitt said. "Our thought is, if we have some test that could be done very frequently, like in a dentist's office, then you could prevent the adverse outcomes of the heart attack and get people on Lipitor or Vytolin, or an exercise regimen before that gets out of hand."

While a functioning saliva test might be five or 10 years away, the lab on a chip is the basis for a portable device that uses a few drops of blood to measure immune function in HIV patients. That toaster-size device, expected to be distributed in the fourth quarter of 2008 through the Austin-based company LabNow which has licensed the technology, is intended for use in Africa where laboratory resources are limited.

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